REMARKS

Claims 1, 2, 4-7, 9-14, 16-19, and 21-24 are rejected as obvious over Rege in view of Belknap. Claims 53 and 54 were previously presented but withdrawn by the Examiner. In view of the Remarks, the Applicant respectfully requests allowance of the pending claims.

The Restriction Requirement

The Office Action withdraws claims 53 and 54 from examination on the grounds that they are directed to a non-elected invention. The Office Action states on page 3 that:

> Newly submitted claims 53-54 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 53-54 are directed towards the CPU is designated to store the video files on the storage system creates a directory based on the data to be stored and stores directory information on disk drives (Page 4, lines 20-22). The claims currently presented are directed towards CPUs having access to the directory to allow access to the data stored on the disk drives (Page 5, lines 4-6).
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> Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 53-54 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03. (Emphasis in original)

The Applicant respectfully disagrees. The independent claims of claims 1 and 13 each include a switch that independently routes requests or responses using "directory information obtained by the processor." Claims 53 and 54, which ultimately depend from claims 1 and 13, respectively, each recite "wherein the directory information comprises an amount of data to be stored." Claims 53 and 54 thus provide a specific example of directory information that is used by a switch to independently route requests or responses. Claims 53 and 54 plainly do not recite creating a directory as alleged in the Office Action. As such, the restriction and withdrawal are improper and the Applicant requests that they be withdrawn by the Examiner. If the Examiner maintains the restriction and withdrawal of claims 53 and 54, the Applicant hereby preserves all rights to petition and/or appeal the restriction and the withdrawal of claims 53 and 54.

Rejections under 35 U.S.C. § 103(a)

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference(s) or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991); M.P.E.P. § 2143.

The Supreme Court recently reaffirmed use of the *Graham* factors for determining obviousness under 35 U.S.C. § 103(a). *KSR Int'l Co. v. Teleflex, Inc.* (*KSR*), No 04-1350 (U.S. Apr. 30, 2007). The four factual inquiries under *Graham* require examination of: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims in issue; (3) the level of ordinary skill in the pertinent art; and (4) the objective evidence of secondary consideration. *Graham v. John Deere* (*Graham*), 383 U.S. 1, 17-18, 149 USPQ 459, 467 (1966); 35 U.S.C. § 103.

In *KSR*, the Supreme Court recognized that the requirement for a teaching, suggestion, or motivation to modify or combine the references and arrive at the claimed invention provides a helpful insight for determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a). *KSR* at 14, 15. In addition, the Court maintained that any analysis supporting a rejection under 35 U.S.C. § 103(a) should be made explicit, and that it is "important to identify reasons that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed, because "inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *Id.*

Independent Claim 1

Claim 1 stands rejected as obvious over Rege in view of Belknap. The Applicant respectfully traverses the rejection of claim 1.

To support a rejection of claim 1, the Office Action states:

> Rege further discloses a switch (400 – figure 2) arranged between the processors (300 – figure 2) and the storage devices (800 – figure 2), wherein the switch independently routes a request for retrieving data from the designated processor directly to the storage devices containing the requested data and independently routes responses from the storage devices directly to the designated processor and wherein the data comprises video stream data (figures 4 & 5; Col. 3, lines 19-35; Col. 3, line 64.

As shown in Figure 2 of Rege, Rege discloses a switch 400 that connects servers 300 to disks 800. The switch 400 includes an "arbiter" for connecting servers 300 to disks 800. The arbiter responds to "switching requests" received from servers 300. Rege at Col. 4, lines 31-39. The switching requests include a "destination address", a "source address", as well as "routing information." Rege at Fig. 7. Rege's switch therefore routes based on address information like conventional routers.

As will be shown below, claim 1 is allowable for at least the reason that the cited language does not disclose a switch independently routing requests and responses based on directory information obtained by the processor, as recited by claim 1.

Rege at Col. 3, lines 19-41 only discloses:

> FIG. 2 shows a multimedia delivery system 200 according to a preferred embodiment of the invention. The system 200 comprises a plurality of servers 300 connected by a crosspoint switch 400 and a local area network (LAN) 210 to a plurality of disk storage systems 800. The servers 300 can be connected to the communications network 160 of FIG. 1 by lines 321. <u>The switch 400 includes a request arbiter</u> 600 explained in further detail below. The storage systems 800 can store multimedia content items such as movies, games, music, databases, and so forth.
>
> During operation of the system 200, demands for selected multimedia items are received from customers via the network 160. <u>The servers 300, in response to the demands, generate data requests for the selected items</u>. The requests are forwarded to the storage systems 800. The storage systems transfer the items to the servers 300 via the switch 400. <u>The operation of the switch 400 is controlled by the arbiter 600</u>. The arbiter 600 can receive switching requests via the LAN 210 from both the servers 300 and the disk systems 800. The arbiter 600 ensures that the selected items are appropriately routed between the servers 300 and the disk systems 800. The servers 300, in turn, present the selected items to the

> network 160 via line 321 to the correct customers. (Emphasis added).

The above-cited language, in view of the discussion of Rege, clearly does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

Rege at Col. 3, line 64 to Col. 4, line 39 only discloses:

> As shown in FIG. 4, a preferred embodiment of the switch 400 includes a plurality of switching elements 500 and an arbiter 600. Each switching elements 500 is bi-directional to allow data to be transferred between the servers 300 and to the disk systems 800. The elements 500 are connected as a crosspoint mesh. Lines 401, 402, and lines 403 (dashed) respectively connect the elements 500 to the servers 300, the disks 800, and the arbiter 600.
>
> <u>During operation of the switch 400, the arbiter 600 can selectively connect, based on the switching requests and priority information, any of the servers 300 to any of the disk systems 800</u>.
>
> As shown in FIG. 5, each of the plurality of switching element 500 includes a first AND gate 510 and a first register 511, and a second AND gate 520 a second register 521. The first AND gate and register 510-511 route multimedia content from the disk systems 800 to the servers 300. The second AND gate and register 520-521 route multimedia content from the servers 300 to the disk systems 800.
>
> Therefore, the first AND gate 510 has one input connected to an output of a specific one of the disk systems 800 by line 501. The output of the AND gate 510 is connected to an input of a specific one of the servers 300 by line 531. The second AND gate 520 has one input connected to an output of the specific server by line 502, and the output is connected to an input of the specific disk system by line 541. The second inputs of the gates 510 and 520 are respectively connected to registers 511 and 521. The registers can be accessed via lines 551-552 by the arbiter 600.
>
> It should be noted that the lines and components can be configured to carry multiple data signals in parallel. For example, the lines, gates and registers and busses can carry 8, 16, 32, 64, or more bits at the time.
>
> <u>During the operation of the switch element 500, the arbiter 600, in</u>

> <u>response to switching requests received from the servers 300 or disk systems 800</u> via the LAN 210 can set the registers 511 and 521 to either a logical zero or one. If a register is set to a logical one, multimedia content is presented at the output of the gates, otherwise, routing of content through the gate is disabled. By selectively setting the registers routing between any server and disk system can be enabled. (Emphasis added).

"Selectively connecting" disks 800 to servers 300 using a "switching request" that contains address data describes conventional switches. Thus, the above-cited language does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

Rege at Col. 4, lines 56-67 only discloses:

> <u>In response to the switching requests, the arbiter 600</u>, if possible, sets the appropriate switching elements 500. If the required elements are busy the requests can be queued. After the switching elements 500 have been set via lines 551-552 of FIG. 5, the arbiter 600 can notify the requesting servers 300 or disk systems 800 so that the transfer of content may proceed. Upon completion, the requesting servers or disk systems notifies the arbiter 600 so that the status of the switching elements can be updated in the state table 634. The switching requests can be data messages transported over the LAN 210 using conventional, for example, FDDI or Ethernet protocols. (Emphasis added).

The above-cited language discloses an arbiter, as discussed above, and so does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

To further support a rejection of claim 1, the Office Action states:

> Rege teaches servers 300 generate data request packets that are sent to disks 800 when a request from a customer is received. <u>The request includes a header, disk address field, size field, server memory address field, and error correction field</u>. The disk address is the logical address of the portion of the selected multimedia to be transferred to the server 300 from disk 800 (Col. 6, lines 6-46). However, Rege is silent on disclosing wherein the switch independently routes a request for retrieving data from the designated processor directly to the storage devices containing the requested data.

The Applicant disagrees. The cited language again only describes conventional switching.

Rege at Col. 6, lines 6-46 only discloses:

> FIG. 10 shows a preferred embodiment of a data request packet 1000 generated to initiate a transfer of content from one of the disk systems 800 to one of the servers. <u>The multimedia request packet 1000 includes a header (HDR) 1010, a disk address field 1020, a size field 1030, a server memory address field 1040, and a error correction field (CRC) 1050</u>.
>
> <u>The header 1010 includes LAN address information to send the data request packet 1000 to the correct disk system 800</u>. <u>For example, the information can include the address of the server making the request</u>. The disk address 1020 is the logical address of the portion of the selected multimedia to be transferred to the server 300. The field 1030 indicates the size, for example byte count, of the content being transferred. The server memory address 1040 is a beginning location in the DRAM 350 of the server 300 where the content portion should be stored. The CRC 1050 can be used to ensure that the packet 1000 is delivered correctly.
>
> In response to customer demands, for example a demand for a selected movie, the "destination" server for content generates appropriate data request packets 1000. The packets are preferably routed to one of the disk systems 800 and queued via the LAN 210. Alternatively, the request packet can be routed to the destination via the switch.
>
> The disk system 800 which will source the content extracts the fields 1020, 1030, and 1040 to fetch the data of the content from the attached disks 820. The requested content is buffered in the cache 832. When the routing between the destination server and the sourcing disk system is enabled by the arbiter 600, the DMA engine 840 can push the multimedia content into the memory of the server beginning at the address 1040.
>
> A disk system can have multiple transfer requests outstanding for different servers 300. Thus, should one of the servers be busy, another request can be processed.
>
> The packets 1000 can also include other types of packets, indicating, for example, load information, server, switch and disk failures, rerouting information, priority information, or other positional information necessary for delivery of multimedia content

> to the customer. (Emphasis added).

The above-cited language, while lengthy, similarly only discloses conventional routing that routes based on address information.

Accordingly, claim 1 is allowable for at least the reason that the above-cited language from Rege fails to disclose a switch that independently routes requests and responses as recited in claim 1.

The cited language from Belknap fails to remedy the deficiencies of Rege. To support a rejection of claim 1, the Office Action states:

> In an analogous art, Belknap discloses a system (10 – figure 1) for retrieving data distributed across a plurality of storage devices (16 – figure 2) (Col. 6, lines 22-52), the system comprising: a switch (12 – figure 1), wherein the switch routes a request for retrieving data from the designated processor directly to the storage devices containing the requested data based on directory information (i.e., RAID mapping for data stored on disks 45) obtained by the processor, and routes responses from the storage devices directly to the designated processor based on the directory information obtained by the processor (Col. 7, lines 4-7 & lines 53-67; Col. 8, lines 41-53; Col. 9, lines 8-31).

The Applicant respectfully disagrees. Belknap at Col. 6, lines 22-52 only discloses:

> A video optimized stream server system 10 (hereafter referred to as media streamer) is shown in FIG. 1 and includes four architecturally distinct components to provide scaleability, high availability and configuration flexibility. The major components follow:
>
> 1) Low Latency Switch 12: a hardware/microcode component with a primary task of delivering data and control information between Communication Nodes 14, one or more Storage Nodes 16, 17 and one or more Control Nodes 18.
>
> 2) Communication Node 14: a hardware/microcode component with the primary task of enabling the "playing" (delivering data isochronously) or "recording" (receiving data isochronously) over an externally defined interface usually familiar to the broadcast industry: NTSC, PAL, D1, D2, etc. The digital-to-video interface is embodied in a video card contained in a plurality of video ports 15 connected at the output of each communication node 14.

> 3) Storage Node 16, 17: a hardware/microcode component with the primary task of managing a storage medium such as disk and associated storage availability options.
>
> 4) Control Node 18: a hardware/microcode component with the primary task of receiving and executing control commands from an externally defined subsystem interface familiar to the computer industry.

The above-cited language, which discloses a "low latency switch", does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1. Conventional switches are often referred to as having "low latency" because they route data based on address information.

Belknap at Col. 7, lines 4-7 and 53-67 only discloses:

> Information is transferred through the switch 12 in packets. Each packet contains a header portion that controls the switching state of individual crossbar switch points in each of the switch chips. The control node 18 provides the other nodes (storage nodes 16, 17 and communication nodes 14) with the information necessary to enable peer-to-peer operation via the low latency switch 12.
>
> In FIG. 1C, internal details of a disk storage node 16 are shown. Each disk storage node 16 includes a switch interface and buffer module 40 which enables data to be transferred from/to a RAID buffer video cache and storage interface module 42. Interface 42 passes received video data onto a plurality of disks 45, spreading the data across the disks in a quasi-RAID fashion. Details of RAID memory storage are known in the prior art and are described in "A Case for Redundant Arrays of Inexpensive Disks (RAID)", Patterson et al., ACM SIGMOD Conference, Chicago, Ill., Jun. 1-3, 1988 pages 109-116.

The above-cited language similarly does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

Belknap at Col. 8, lines 41-53 only discloses:

> Each control node 18 is configured as a PC and includes a switch interface module for interfacing with low latency switch 12. Each control node 18 responds to inputs from system controller 64 to

> provide information to the communication nodes 14 and storage nodes 16, 17 to enable desired interconnections to be created via the low latency switch 12. Furthermore, control node 18 includes software for enabling staging of requested video data from one or more of disk storage nodes 16 and the delivery of the video data, via a stream delivery interface, to a user display terminal. Control node 18 further controls the operation of both tape and disk storage nodes 16, 17 via commands sent through low latency switch 12.

The above-cited language's reference to a "low latency switch" does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

Belknap at Col. 9, lines 8-31 only discloses:

> When commands are issued over the control interface to start the streaming of data to an end user, control node 18 selects and activates an appropriate communication node 14 and passes control information indicating to it the location of the data file segments on the storage nodes 16, 17. The communications node 14 activates the storage nodes 16, 17 that need to be involved and proceeds to communicate with these nodes, via command packets sent through the low latency switch 12, to begin the movement of data.
>
> Data is moved between disk storage nodes 16 and communication nodes 14 via low latency switch 12 and "just in time" scheduling algorithms. The technique used for scheduling and data flow control is more fully described below. The data stream that is emitted from a communication node interface 14 is multiplexed to/from disk storage nodes 16 so that a single communication node stream uses a fraction of the capacity and bandwidth of each disk storage node 16. In this way, many communication nodes 14 may multiplex access to the same or different data on the disk storage nodes 16. For example, media streamer 10 can provide 1500 individually controlled end user streams from the pool of communication nodes 14, each of which is multiplexing accesses to a single multimedia file spread across the disk storage nodes 16. This capability is termed "single copy multiple stream".

The above-cited language discloses "multiplexing" a data stream to or from disk storage nodes, but does not disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

Accordingly, claim 1 is allowable for at least the reason that the above-cited language

from Rege and Belknap clearly fails to disclose a switch that independently routes requests and responses based on directory information obtained by the processor, as recited in claim 1.

To support a rejection of claim 1, the Office Action states:

> Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Rege to include retrieving data from the designated processor directly to the storage devices containing the requested data based on directory information obtained by the processor, and independently routes responses from the storage devices directly to the designated processor based on the. directory information obtained by the processor as taught by Belknap for the benefit of providing an improved data retrieval system that can provide video data to customers in a more immediate fashion.

The Applicant respectfully disagrees. First, there can be no motivation to combine Rege and Belknap in order to arrive at claim 1 because Rege and Belknap fail to disclose every element of claim 1.

Second, Rege cannot be modified to arrive at the invention of claim 1 because the proposed modification would change the principle of operation of Rege. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959); M.P.E.P. § 2143.

Specifically, as discussed above, the switch of Rege routes data based on address information contained in "switching requests." Rege at Col. 5, lines 1-3. The "arbiter" of Rege does not independently route information as recited in claim 1, but rather relies on the "switching requests" to set registers and thereby route data between servers 300 and disks 800. Rege at Col. 4, lines 31-39. Modifying the arbiter of Rege to independently route requests and responses based on directory information obtained by the processor would therefore clearly change the principle of operation (use of the arbiter) of Rege. Thus, one of skill in the art at the time the invention of claim 1 was made would not be motivated to combine Rege and Belknap because the proposed modification of Rege would change the principle of operation of Rege.

Claim 13 recites a switch that uses directory information obtained by the processor to independently route a request for data, and so claim 13 is allowable for at least the reasons given

for the allowability of claim 1.

Dependent Claims 2, 4-7, 9-12, 14, 16-19, 21-24

The Applicant respectfully asserts that claims 2, 4-7, 9-12, 14, 16-19, and 21-24 are allowable for at least the reason that each depends from an allowable claim.

CONCLUSION

In view of the Remarks, each of the presently pending claims in the Application is believed to be in immediate condition for allowance. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,
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